

Claims:

- 1 1. A waste liquid regeneration apparatus for a printer,
2 characterized in that
3 said liquid regeneration apparatus comprises:
4 a vessel into which waste liquid containing ink
5 pigment, water and cleaning fluid used in said printer
6 is supplied;
7 a metal electrode plate disposed in said vessel for
8 partitioning the inside of said vessel into a first chamber
9 and a second chamber and for allowing the waste liquid
10 to flow therethrough;
11 a high-voltage power supply for applying a voltage
12 to said metal electrode plate; and
13 a grounding electrode connected to said first chamber.
- 1 2. The waste liquid regeneration apparatus for a printer
2 as set forth in claim 1, characterized in that
3 one or a plurality of additional metal electrode
4 plates for allowing the waste liquid to flow therethrough
5 are provided in a juxtaposed and spaced relationship with
6 from each other in said second chamber such that each of
7 said metal electrode plates partitions said second chamber,
8 and that
9 said high-voltage power supply is connected to each
10 of said metal electrode plates including said metal
11 electrode plate which partitions the inside of said vessel

12 into said first chamber and second chamber.

1 3. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 2, characterized in that a higher
3 voltage is applied to any of said metal electrode plates
4 as the distance from said grounding electrode to the metal
5 electrode plate increases.

1 4. The wasteliquid regeneration apparatus for a printer
2 as set forth in any one of claims 2 and 3, characterized
3 in that a voltage is applied to each of said metal electrode
4 plates from a corresponding one of the high-voltage power
5 supplies such that a higher field intensity is generated
6 by the metal electrode plate as the distance from said
7 grounding electrode to the metal electrode plate decreases.

1 5. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 1 or 2, characterized in that
3 a waste liquid supplying pipe for supplying the waste
4 liquid is connected to said first chamber, and that
5 a cleaning fluid recovering pipe for recovering the
6 regenerated cleaning fluid is connected to said second
7 chamber.

1 6. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 5, characterized in that
3 said waste liquid supplying pipe and said cleaning

4 fluid recovering pipe are connected to a blanket drum
5 cleaning apparatus for cleaning a blanket drum of said
6 printer, and that

7 the waste liquid discharged from said blanket drum
8 cleaning apparatus is supplied to said first chamber
9 through said waste liquid supplying pipe and the cleaning
10 fluid regenerated in said second chamber is recovered by
11 said blanket drum cleaning apparatus through said cleaning
12 fluid recovering pipe.

1 7. The waste liquid regeneration apparatus for a printer
2 as set forth in claim 1 or 2, characterized in that a
3 reservation section for settling the water separated from
4 the waste liquid and reserving the water is provided at
5 a lower portion of said first chamber.

1 8. The waste liquid regeneration apparatus for a printer
2 as set forth in claim 1 or 2, characterized in that
3 said grounding electrode is disposed substantially
4 horizontally at a lower portion of the inside of said vessel,
5 and that

6 said metal electrode plate or plates are disposed
7 substantially horizontally above said grounding electrode
8 in said vessel.

1 9. The waste liquid regeneration apparatus of a printer
2 as set forth in claim 8, characterized in that

3 a partition wall is disposed in the proximity of
4 a first side wall of the inside of said vessel, that
5 said metal electrode plate or plates are disposed
6 between a second side wall opposing to the first side wall
7 of the inside of said vessel and said partition wall, that
8 said waste liquid supplying pipe for supplying the
9 waste liquid is connected to a region defined by said
10 partition wall and said first side wall, and that
11 said cleaning fluid recovering pipe for recovering
12 the regenerated cleaning fluid is connected to another
13 region surrounded by said metal electrode plate or plates,
14 said second side wall and said partition wall.

1 10. The wasteliquidregenerationapparatusforaprinter
2 as set forth in claim 1 or 2, characterized in that said
3 metal electrode plate or plates are a wire mesh type metal
4 electrode plates.

1 11. The wasteliquidregenerationapparatusforaprinter
2 as set forth in claim 1 or 2, characterized in that said
3 waste liquid regeneration apparatus for a printer further
4 comprises a scraping plate for scraping off ink pigment
5 agglomerated on and adhering to said grounding electrode
6 to remove the ink pigment from said grounding electrode.

1 12. The wasteliquidregenerationapparatusforaprinter
2 as set forth in claim 1 or 2, characterized in that said

3 grounding electrode is mounted for extraction to the
4 outside of said vessel.

1 13. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 1 or 2, characterized in that
3 said grounding electrode is formed as a metal sheet
4 which can be taken up in a coiled form, and that
5 said waste liquid regeneration apparatus for a
6 printer further comprises:
7 a delivering apparatus disposed outside said vessel
8 for delivering said metal sheet, and
9 a take-up apparatus provided outside said vessel
10 for taking up said metal sheet after said metal sheet is
11 delivered from said delivering apparatus and used in said
12 vessel.

1 14. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 1 or 2, characterized in that said
3 waste liquid regeneration apparatus for a printer further
4 comprises:
5 thin paper in the form of a roll for covering a surface
6 of said grounding electrode;
7 a delivering apparatus disposed outside said vessel
8 for delivering said thin paper, and
9 a take-up apparatus disposed outside said vessel
10 for taking up said thin paper after said thin paper is
11 delivered from said delivering apparatus and used in said

12 vessel.

1 15. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 1 or 2, characterized in that
3 said grounding electrode is formed as a rotatable
4 metal bar having a cylindrical shape, and that
5 said metal electrode plate or plates are formed in
6 a cylindrical shape so as to surround the outside of said
7 grounding electrode.

1 16. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 15, characterized in that the waste
3 liquid regeneration apparatus for a printer further
4 comprises a blade provided in sliding contact with said
5 metal bar for scraping off ink pigment adhering to the
6 outside surface of said metal bar.

1 17. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 1 or 2, characterized in that
3 said grounding electrode is formed as a rotatable
4 metal disc, and that
5 a blade is provided in sliding contact with said
6 metal disc for scraping off the ink pigment adhering to
7 the outside surface of said metal disc.

1 18. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 1 or 2, characterized in that

3 said grounding electrode is formed as an endless
4 metal sheet, and

5 said waste liquid regeneration apparatus for a
6 printer further comprises:

7 a driving apparatus for driving said endless metal
8 sheet to rotate; and

9 a blade provided in sliding contact with said endless
10 metal sheet for scraping off the ink pigment adhering to
11 the outside surface of said metal sheet.

1 19. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 1 or 2, characterized in that said
3 grounding electrode is formed from an
4 electrically-conductive protuberance or a network-like
5 metal member.

1 20. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 19, characterized in that said waste
3 liquid regeneration apparatus for a printer further
4 comprises an ultrasonic oscillation apparatus for applying
5 oscillation to said grounding electrode to re-dissolve
6 the ink pigment adhering to said grounding electrode into
7 the cleaning fluid.

1 21. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 1 or 2, characterized in that
3 said metal electrode plate or plates are disposed

4 horizontally or substantially horizontally in said vessel
5 to form said first chamber below said second chamber, that
6 a third chamber for reserving the water below said
7 first chamber is provided in a spaced relationship from
8 said metal electrode plate or plates, and that
9 said grounding electrode is connected to said third
10 chamber.

1 22. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 21, characterized in that
3 a waste liquid supplying pipe for supplying the waste
4 liquid is connected to said first chamber, that
5 a cleaning fluid recovering pipe for recovering the
6 regenerated cleaning fluid is connected to said second
7 chamber, that
8 a regenerated water recovering pipe for recovering
9 the regenerated water is connected to a portion higher
10 than a bottom portion in said third chamber, and that
11 a remaining liquid recovering pipe for recovering
12 remaining liquid in said vessel is connected to the bottom
13 of said third chamber.

1 23. The wasteliquid regeneration apparatus for a printer
2 as set forth in claim 22, characterized in that said waste
3 liquid regeneration apparatus for a printer further
4 comprises a returning flow path for returning at least
5 one of the regenerated cleaning fluid, regenerated water

6 and remaining liquid recovered through said cleaning fluid
7 recovering pipe, said regenerated water recovering pipe
8 and said remaining liquid recovering pipe.

1 24. The waste liquid regeneration apparatus for a printer
2 as set forth in claim 21, characterized in that said third
3 chamber is formed in a funnel-shape.

1 25. The waste liquid regeneration apparatus for a printer
2 as set forth in claim 24, characterized in that said third
3 chamber has an inner face soil release processed for
4 preventing adhering of the ink pigment thereto.

1 26. The waste liquid regeneration apparatus for a printer
2 as set forth in claim 21, characterized in that
3 said waste liquid regeneration apparatus for a
4 printer further comprises a waste liquid supplying
5 apparatus for supplying the waste liquid to said first
6 chamber, and that
7 said waste liquid supplying apparatus is configured
8 so as to allow operation thereof in accordance with an
9 intermittent supplying method wherein supply of the waste
10 liquid and stopping of the supply are performed alternately.

1 27. The waste liquid regeneration apparatus for a printer
2 as set forth in claim 26, characterized in that said waste
3 liquid regeneration apparatus for a printer further

4 comprises:

5 a first detection apparatus for detecting a physical
6 amount correlated with the concentration of the ink
7 pigment in the regenerated cleaning fluid separated from
8 the waste liquid in said first chamber and recovered into
9 said second chamber or a physical amount correlated with
10 the concentration of the ink pigment in the regenerated
11 cleaning fluid; and

12 a control apparatus for controlling at least one
13 of a supplying rate, supplying time and stopping time of
14 the waste liquid by said waste liquid supplying apparatus
15 in response to a result of the detection of said first
16 detection apparatus so that the concentration of the ink
17 pigment in the regenerated cleaning fluid may remain within
18 a predetermined control range.

1 28. The waste liquid regeneration apparatus for a printer
2 as set forth in claim 26, characterized in that said waste
3 liquid supplying apparatus further allows operation
4 thereof in accordance with a continuous supplying method
5 wherein the waste liquid is supplied continuously and is
6 configured for changing over between the intermittent
7 supplying method and the continuous supplying method.

1 29. The waste liquid regeneration apparatus for a printer
2 as set forth in claim 28, characterized in that said waste
3 liquid regeneration apparatus for a printer further

4 comprises:

5 a second detection apparatus for detecting a physical
6 amount correlated with the concentration of the water in
7 the waste liquid supplied into said first chamber by said
8 waste liquid supplying apparatus or a physical amount
9 correlated with the concentration of the water in the waste
10 liquid; and

11 a changeover apparatus for changing over the waste
12 liquid supplying method of said waste liquid supplying
13 apparatus in response to a result of the detection of said
14 second detection apparatus such that, when the
15 concentration of the water in the waste liquid is within
16 a predetermined range, said waste liquid supplying
17 apparatus is operated in accordance with the intermittent
18 supplying method, but when the concentration of the water
19 in the waste liquid is outside the predetermined range,
20 said waste liquid supplying apparatus is operated in
21 accordance with the continuous supplying method.

1 30. A waste liquid regeneration method for regenerating
2 waste liquid containing ink pigment, water and cleaning
3 fluid used in a printer, characterized in that

4 an electrostatic field is generated in the waste
5 liquid such that the water and the ink pigment are
6 electrostatically agglomerated from within the waste
7 liquid making use of electrophoresis of the ink pigment
8 by the electrostatic field to separate the waste liquid

9 into the cleaning fluid, water and ink pigment.